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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
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09/636,000

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Stephen P. Pope

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10/01/2003

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EXAMINER

BURD, KEVIN MICHAEL

ART UNIT

PAPER NUMBER

2631

DATE MAILED: 10/01/2003

6

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

09/636,000

Applicant(s)

POPE, STEPHEN P.

Examiner

Kevin M Burd

Art Unit

2631

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 05 March 2001.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-12 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-5, 7, 11 and 12 is/are rejected.
- 7) ☒ Claim(s) 6 and 8-10 is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☒ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
- Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- 11) ☐ The proposed drawing correction filed on _____ is: a) ☐ approved b) ☐ disapproved by the Examiner.
- If approved, corrected drawings are required in reply to this Office action.
- 12) ☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. §§ 119 and 120

- 13) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- * See the attached detailed Office action for a list of the certified copies not received.
- 14) ☒ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).
- a) ☐ The translation of the foreign language provisional application has been received.
- 15) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892) 4) ☐ Interview Summary (PTO-413) Paper No(s). _____
- 2) ☒ Notice of Draftsperson's Patent Drawing Review (PTO-948) 5) ☐ Notice of Informal Patent Application (PTO-152)
- 3) ☒ Information Disclosure Statement(s) (PTO-1449) Paper No(s) 4 . 6) ☐ Other: _____

DETAILED ACTION

Specification

1. The abstract of the disclosure is objected to because the first "sentence" of the abstract is a sentence fragment and line 15 of the abstract should be deleted.

Correction is required. See MPEP § 608.01(b).

2. The disclosure is objected to because of the following informalities: the equations referenced on page 8, after line 5, are missing.

Appropriate correction is required.

Claim Objections

3. Claim 7 is objected to because of the following informalities: the phrase "the class of soft decision generators" is stated in line 2. The phrase should be changed to "a class of soft decision generators". Appropriate correction is required.

4. Claims 8-10 are objected to because of the following informalities: claim 8 describes a step of determining valid initial states by substituting don't cares for certain bits. However, applicant describes a plurality of bits in an initial state mask having a first polarity or a second polarity. It is believed Applicant is trying to claim the method described in the example on page 31, lines 24-31. On page 31, the bit value of the initial mask is determined, not a "polarity", and when this bit value is a "1", for example, those bit positions in the initial state are substituted for don't cares. A polarity comprises a

positive or a negative. A "0" bit value would not be a negative. Appropriate correction or clarification is required.

Claim Rejections - 35 USC § 102

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

5. Claim 1 is rejected under 35 U.S.C. 102(b) as being anticipated by Cooper (US 5,502,735).

Regarding claim 1, Cooper discloses a maximum likelihood sequence detector (title) for estimating a sequence of transmitted symbols received over a communication channel (column 1, lines 6-10). A trellis of states and paths are associated with the possible transmitted symbol sequences (figure 1). The detector comprises a plurality of data sources relating to state transition probabilities and observed values of received data symbols (abstract). Means for calculating and storing the likelihood metric and the survivor bit for each state of the trellis is disclosed in column 3, lines 54-61. This data is read out of storage to estimate the most likely sequence of transmitted data. This reading step is commonly known in the art as "trace-back" (column 3, lines 61-64). The largest partial path metric is selected at the final stage of the trellis (column 10, lines 63-65). This is the final state.

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

6. Claims 2, 3 and 7 are rejected under 35 U.S.C. 103(a) as being unpatentable over Cooper (US 5,502,735) in view of Beat (US 5,687,352).

Regarding claim 2, Cooper discloses the maximum likelihood sequence detector as stated above in paragraph 5. Cooper does not disclose computing the branch metric parameter calculations with a Gray code. Beat discloses a method of changing one binary sequence to another binary sequence by changing only one bit of that sequence using a Gray code (column 2, lines 22-33). By changing states of the binary sequence by changing only one bit on any one transition, components of the circuit are eliminated and the effective speed of the circuit is increased (column 2, lines 28-33). For this reason, it would have been obvious for one of ordinary skill in the art at the time of the invention to incorporate the method of changing transitions of Beat into the detector of Cooper.

Regarding claim 3, Cooper discloses the branch metric parameters are pre-computed and stored in memory prior to the forward trace through the trellis (column 6, lines 5-9).

Regarding claim 7, Copper discloses inputting partial path metrics to MUX 46 in figure 7 to generate soft decision data 44 (column 15, line 59 to column 16, line 3).

7. Claim 4 is rejected under 35 U.S.C. 103(a) as being unpatentable over Cooper (US 5,502,735) in view of Beat (US 5,687,352) further in view of Murakami (US 5,440,588).

Regarding claim 4, the combination of Cooper and Beat disclose the detector stated above in paragraph 6. The combination does not disclose the branch metric parameters are calculated in real time. Murakami discloses conventional maximum likelihood sequence estimation uses a large amount of real time calculations to calculate the branch metrics and the final sequence (column 5, lines 14-56). Murakami further discloses a method of eliminating some of these real time calculations in the disclosure. It would have been obvious for one of ordinary skill in the art at the time of the invention to use the teachings of Murakami in the combination of Cooper and Beat. The use of real time calculations in calculating the branch metrics is a conventional method of calculating branch metrics and is beneficial since it eliminates the memory used to store the pre-computed branch metric values. No memory is needed for these calculations in real time.

8. Claim 5 is rejected under 35 U.S.C. 103(a) as being unpatentable over Cooper (US 5,502,735) in view of Hladik et al (US 5,721,746).

Regarding claim 5, Cooper discloses the maximum likelihood sequence detector as stated above in paragraph 5. Cooper does not disclose calculating "valid" initial states representing prior knowledge about the transmitted sequence for use in the decoder. Hladik discloses using prior information to calculate the probabilities of the initial starting states (column 7, lines 56-63). The information about the states is stored in registers (column 3, lines 8-17). Any state with at least a probability of being the starting state must be used to insure the correct sequence is output and therefore is a "valid" starting state. It would have been obvious for one of ordinary skill in the art at the time of the invention to utilize the teachings of Hladik in the decoder of Cooper to remove the starting states of the trellis that have no probability of being the initial starting state. To use these states would be a waste of resources.

9. Claims 11 and 12 are rejected under 35 U.S.C. 103(a) as being unpatentable over Jekal (US 6,035,428) in view of Beat (US 5,687,352).

Regarding claim 11, Jekal discloses a method for computing a maximum likelihood sequence estimate comprising providing a trellis comprising nodes corresponding to a plurality of states at a plurality of stages (column 1, lines 34-65). The present state and next state comprises a series of bits (column 1, lines 41-48). Jekal does not disclose incrementing the present state to a next state by changing only one bit. Beat discloses a method of changing one binary sequence to another binary sequence by changing only one bit of that sequence (column 2, lines 22-33). By changing states of the binary sequence by changing only one bit on any one transition,

components of the circuit are eliminated and the effective speed of the circuit is increased (column 2, lines 28-33). For this reason, it would have been obvious for one of ordinary skill in the art at the time of the invention to incorporate the method of changing transitions of Beat into the method of Jekal.

Regarding claim 12, Beat discloses Gray code is used to increment the present state to a next state (column 2, lines 22-33).

Allowable Subject Matter

10. Claim 6 is objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

Conclusion

Any response to this action should be mailed to:

Commissioner of Patents and Trademarks
Washington, D.C. 20231

or faxed to:

(703) 872-9314, (for formal communications intended for entry or for informal or draft communications, please label "PROPOSED" or "DRAFT")

Hand-delivered responses should be brought to Crystal Park II, 2121 Crystal Drive, Arlington, VA., Sixth Floor (Receptionist).

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Kevin Burd, whose telephone number is (703) 308-7034. The Examiner can normally be reached on Monday-Thursday from 9:00 AM - 6:00 PM.

Art Unit: 2631

Any inquiry of a general nature or relating to the status of this application should be directed to the Group receptionist whose telephone number is (703) 305-3800.



Kevin M. Burd
PATENT EXAMINER
9/29/03